

→ Mr. Barton

MEMO TO MR. WAGAHOFF

1. As per your recent request, attached is a suggested rationale for inclusion of an extra foot of freeboard in the WBHP levees as an allowance for future change in apparent sea level.
2. I have found only one prior expression by us which speaks directly to this issue. It was in the Reevaluation Study for Lake Pontchartrain, La. & Vic. The attached rationale represents a reasonable extension of that expression.

FREDERIC M. CHATRY
3/4/87

CF: w/encl

Mr. Seale

Mr. Soileau

Mr. Picciola

Mr. Shelton

✓ Mr. Harrington *As* CF: Mr. Barton

Mr. Judlin

As is well documented over time, absolute sea level is not constant. The record includes periods of consistent rise or fall with contrary excursions sandwiched in. For the past 5,000 years, the trend has been consistently up. The current rate of rise in absolute sea level is thought to be less than 1.0 foot per century. A number of scenarios developed in the last few years project wildly accelerating rates of sea level rise due to the increased accumulations of carbon dioxide in the atmosphere. These scenarios are far too conjectural to influence project planning.

The impact of sea level rise on land areas is very much influenced by local conditions. Where the coastal land mass rises sharply as one moves landward from the shoreline, the impact is minimized, and where it does not, that impact is intensified. Furthermore, the vertical stability of the land mass involved is most important. Where subsidence is material, the impact of such subsidence frequently is far more important than the rise in absolute sea level. Insofar as those who live on the land mass are concerned, it makes no difference whether the sea goes up or the land goes down, for the impact is the same. Thus, planners in coastal areas must be more concerned with what is called the apparent rise in sea level than with the absolute rise.

The "stuff" of which Coastal Louisiana is largely comprised is the accumulated sediments brought down by the Mississippi. Depending upon location, it is more or less susceptible to various influences, all of which result in subsidence of the land mass over time. These include consolidation, compaction, downwarping of the coastal region under the load of sedimentation accumulation, faulting, and to some extent, extraction of groundwater and/or minerals. A localized phenomenon associated with forced drainage of developed areas can result in dramatic reductions in land elevations as the water is removed from highly organic surface soils, but this phenomenon is usually not particularly important insofar as levee grades are concerned.

Subsidence rates (excluding the aforementioned phenomenon) in some parts of the project area of as much as 2.0 - 2.5 feet per century have been observed while in others rates have been much lower. Unfortunately, the measurement of subsidence rates is not an exercise in precision, and the economic and environmental costs to build into levee projects allowances which would accommodate the larger values are so great as to preclude such allowances. There is, however, no doubt that subsidence is going on in the project area, and it represents another element of uncertainty with respect to the establishment of a levee freeboard to deal with the admittedly less than totally precise nature of our calculations. Currently, it is our practice to allow a freeboard of 2 feet above stillwater levels for levees not subject to waves, and 3 feet of freeboard above the stillwater level, or the limit of wave runup, whichever is the higher, where waves are a factor. An additional allowance of 1 foot for possible future changes in apparent sea level is believed to be prudent.